Education for the Professional Generalist

Russell W. Peterson

In 1942, after spending eight wonderful years as a student at the University of Wisconsin–Madison, I left—proud of my new Ph.D. in chemistry—not realizing how little I knew. My four years in graduate school, working long hours seven days a week, taught me much about "The Inhibition of the Air Oxidation of Vitamin C" but little else. Last summer I returned to spend a few months as a visiting professor in the Institute for Environmental Studies. I returned not as a chemist, but as a professional generalist to teach a course on "Prospects for the Global Environment."

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My lifetime of on-the-job training for becoming a generalist has included careers in education, research, industrial management, politics, state and federal government, citizen action, and world conservation and development. I have seen firsthand that it is more the rule than the exception that people enter the most influential positions in our society ill-prepared for the breadth of their assignments. This includes presidents and other politicians, captains of industry, university presidents and deans, cabinet and military officers, judges, editors and journalists, ambassadors, and heads of citizens' organizations. No institution of higher education provides formal training for such important posts.

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These jobs call for highly skilled generalists, people who understand such things as the place of Homo sapiens in the biosphere; the interdependence of all people and nations; and how the world's economic, political, social, and management systems operate. Our leaders must be able to discern the possible long-term impacts of specific research and development projects. Their decisions should reflect a firm grasp of the historical record from geologic time to the present; the physical, chemical, and biological nature of things; and computerized techniques for assessing trends and appraising alternative futures.

Top leaders are not the only ones who can benefit from a good general education. We all need a broad understanding

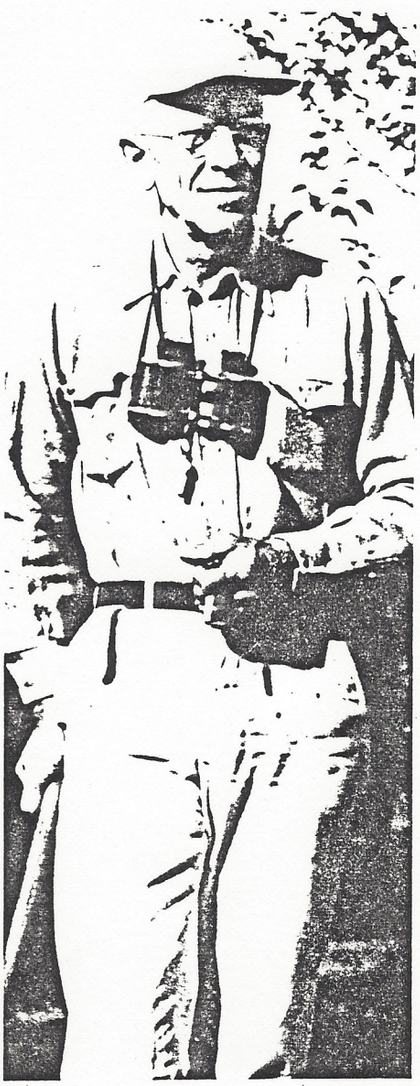
of the world around us at least as much as we need specialized skills and information. An American pediatrician who understands the implications of 40,000 children dying each day in developing countries would be more likely to seize an opportunity to work with the United Nations Children's Fund than someone less informed. A father might better understand his rebellious teenage daughter if he saw the ties between the physical and psychological upheavals of adolescence, his formerly mild-mannered daughter's behaviour, and the culture in which she is growing up. A young engineer working on petroleum exploration might decide to grab an opportunity to work on solar energy, if she appreciated the uncertain future of fossil fuels. A mother concerned about her children's future and aware of the global interconnectedness of life might decide to lobby her senators to increase foreign aid, which is currently declining.

Today's good liberal arts programs provide much of what is needed as an undergraduate foundation to support the more vigorous graduate work required for a professional generalist. Much can be done, however, to make such undergraduate programs more comprehensive and meaningful. The two-year Integrated Liberal Studies Program in L&S is a good example. Its general education core curriculum of interdisciplinary and inter-related courses weaves together classic ideas and contemporary problems, offering an alternative to undergraduate education based on either scattered electives or premature specialization.

Connected World: Disconnected Universities

The discovery that all life, air, water, and land, are interconnected and interdependent constitutes probably the most significant scientific finding of the past century, particularly since it has been coupled with the realization that human interventions in the natural world have long-term consequences. Rachel Carson's *Silent Spring*, Aldo Leopold's *Sand County Almanac*, and J. E. Lovelock's *Gaia* are examples of publications that have helped to further this view. In light of its wide-ranging implications, I believe that no one who fails to grasp this fundamental understanding of reality is adequately educated.

As the famous University of Wisconsin Professor, Aldo Leopold, put it, "All the sciences and arts are taught as though they were separate. They are separate only in the classroom. Step out on the campus and they are immediately fused."



State Historical Society of Wisconsin

Aldo Leopold

My personal enlightenment was triggered in 1952 when my ten-year-old son got me interested in the study of birds. The birds, good ecological indicators, taught me about the interconnectedness of things and encouraged me, while a Director of Research for the Dupont Company, to learn more of environmental science. As Governor of Delaware, I applied this background in fathering landmark environmental legislation, including the Delaware Coastal Zone Act, which prohibits by law any more heavy industry in a several-mile-wide strip along the coast. From 1973 to 1976, I served as Chairman of the President's Council on Environmental Quality and subsequently as Director of the Congressional Office of Technology Assessment. These posts involved me worldwide in critical problems concerning the biosphere. I learned firsthand of their environmental, economic, political, technical, and social connections and of the inadequate understanding most decisionmakers have about such relationships. Later, as President of the National Audubon Society, I learned how education and citizen action at the local level can affect decisions about global issues at the national and international levels. Now, through leadership positions in five international organizations—dealing with peace, population, the environment, resources, and development—and extensive reading in these fields, I find my earlier convictions about the need for more professional generalists strongly reinforced.

Unfortunately, university administrators and department heads, with rare exception, have yet to catch up with the new holistic understanding. They continue to plan and manage their institutions from the reductionist and compartmentalized vantage point of the traditional disciplines. As the famous University of Wisconsin Professor, Aldo Leopold, put it, "All the sciences and arts are taught as though they were separate. They are separate only in the classroom. Step out on the campus and they are immediately fused." Since Leopold's time, some faculty members throughout academe have broadened their own education, research, teaching, and outreach work well beyond the normal confines of their disciplines. They are the ones who—against much opposition—have initiated and staffed the promising interdisciplinary programs now extant on many campuses.

There are many interdisciplinary courses and programs at the UW–Madi-

son. For the most part, though, each interested student or professor must find her or his own way through the maze. Most courses are still taught within traditional disciplines, and no structure exists to support or promote interdisciplinary study per se. Two exceptions to this are the successful seventeen-year-old Institute for Environmental Studies and L&S's Integrated Liberal Studies Program. Such programs point the way to the future.

Intellectual Territory: The "Old" Way Isn't Working

As more people become aware of the global interconnectedness of all life and life-support systems, as more faculty become disenchanted with their discipline's lack of pertinence to the real world, and as more citizens recognize the ineptness of our specialists in coping with the complex issues of the day, the pressure on our educational system will build until discrete institutions of integrated studies are established within or without existing universities.

During the 1980s, interdisciplinary programs have been downgraded on university campuses across the United States. Today, there are fewer such programs than in the 1970s, with many existing in name only. For example, two years ago I met with 100 leaders of environmental studies programs from fifty-six universities. Every one of them agreed that they were treated as second-class citizens on their campuses. During lean financial years they received vastly disproportionate cuts in their budgets and in most cases failed to gain approval for granting degrees or providing faculty tenure. Two key factors in this downgrading seem to be the increased competition for funding among even the traditional disciplines and faculty members' concerns about intrusion into their academic territories. Furthermore, since interdisciplinary programs are comparatively new, they don't have the same type of institutional power-base as the established disciplines. Meanwhile, we continue to learn more about the way society, culture, and politics interact with the natural world. And polls show that people are increasingly concerned about protecting their global environment.

Mother Theresa addresses the U.N. Conference on Human Settlements, 1976. On the platform, seated, are Peterson, serving as Vice Chairman of the U.S. delegation to the conference, and Dr. Julia Ojiambo of Kenya.

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Professor Lynton K. Caldwell of Indiana University has expressed well the need for what he calls metadisciplinary knowledge. He has written,

> . . . the need to organize and focus complex bodies of knowledge is a consequence of human inability to wisely and effectively utilize that knowledge in disconnected specialized increments. Unless a better means of integrating and focusing our expanding knowledge is achieved, the advancement of all knowledge may be frustrated by the massive incoherence of increasing specialization. Indeed, the future of reductionist science and specialization may depend upon our ability to relate their components to a hierarchy of knowledge designed to integrate successive levels of complexity dynamically.

Last fall I presided over a meeting of the Council of the International Union for the Conservation of Nature and Natural Resources (IUCN). In attendance were leaders from all parts of the world, each having been educated as a specialist, but over the years having evolved into a global generalist. An outstanding example is the President of IUCN, Dr. M. Swaminathan of India, an agricultural scientist. (At one time he was a post-doctoral researcher at the UW–Madison, and he has also received an honorary doctorate from this university.) A student of several cultures and languages, he has worked in and outside of government and nationally and internationally on food production, hunger, health, conservation, and other quality-of-life issues.

IUCN is working with both government and nongovernment organizations worldwide to further a strategy aimed at providing a decent life for future generations on a sustainable basis. As a group we believe that the biggest obstacle to the success of this World Conservation Strategy is the lack of people in decision-making and advisory po-

sitions trained to think holistically and to pursue integrated multifaceted programs.

Breadth vs. Depth: A Dead Argument

Specialists often contend that breadth of knowledge means loss of depth. On the contrary, the knowledge required to cope with the problems our world now faces is of a *higher* order. Rather than requiring less rigor than training in one discipline, I believe training in a metadiscipline, to use Caldwell's term, calls for more rigor. Not understanding the interconnections, the specialist looks at a metadiscipline blindly.

Some people, for example, call environmental issues "special interests." I disagree. They are issues of the most general interest. They are profoundly related to all quality-of-life issues, including health, poverty, racism, war, economics, and politics. Humanity is an integral part of the environment—one of the millions of interconnected species that inhabit the biosphere, all dependent upon each other and upon the air, water, soil, and sun. It is the activity of humans worldwide that most threatens this unique assembly of life and its delicate balance, so everyone has a stake in environmental issues. And humanists, social scientists, physical scientists, biological scientists, lawyers, physicians, and engineers all have expertise to contribute to resolving environmental problems.

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If we are to solve many of the problems of humanity and take full advantage of life's opportunities, we must develop more interdisciplinary approaches to augment time-tested specialization. The latter will, of course, also continue to be highly important in advancing knowledge.

Professor F. Kenneth Hare, then of the University of Toronto, wrote in *Science* in 1970,

> I must stress the incompetence of the established disciplines to tackle many of society's real problems. What we mean by a discipline is an agreed tested body of method—usually analytical—that we bring to bear on problems of our own choosing. The essence of our thinking is that we cannot tackle problems that do not fit the competence of our own discipline. . . . The existing departmental and disciplinary structure of the university is out of kilter with the needs of action-oriented, policy-directed programs.

Rapid Change: The Invisible Foot

The escalating rate of change in the world increases the need for interdisciplinary training and action and for more attention to the future impacts of decisions. We no longer can muddle through, basing our decisions on fragments of specialized information or on this year's profit or next year's election if we wish to avoid unprecedented catastrophes.

We cannot again wait for thirty-seven years after a new development before investigating the long-term biological consequences of its use, as we did in the case of the nuclear bomb. Chemists, physicists, and military engineers worked on the bomb, but biologists and agriculturalists essentially ignored it until 1982, when Drs. Paul Crutzen and John Birks reported in *Ambio* magazine that the fires ignited by a nuclear exchange would loft enough soot into the atmosphere to block sunlight for months, bringing darkness and lower temperatures. This finding triggered studies by climatologists and biologists, who in the intervening six years have agreed that the anticipated temperature drop from a nuclear exchange between the U.S. and the U.S.S.R. would devastate agricultural production around the world, causing, for example, more deaths from famine in noncombatant India than in both the U.S. and the U.S.S.R. from the immediate effects of the exchange. Still today the policymakers in governments essentially ignore this finding. If the Western Allies faced up to its implications, their current strategy to use nuclear weapons first if necessary in defense of Europe would be seen as insane.

Many U.S. policymakers exhibit a single-track mind in pushing military build-up as the solution to threats of Communism. Professor John Kenneth Galbraith, a professional generalist as well as a respected economist, put this narrow field of interest in perspective when he wrote about the results of a nuclear exchange between the superpowers: "No one, not even the most talented ideologue will be able to tell the ashes of capitalism from the ashes of socialism."

We should no longer focus solely on the economic miracles that can be wrought by Adam Smith's "invisible hand," but should also try to avoid being kicked by the "invisible foot" that has so clearly demonstrated its long-range destructiveness. For example, the development of nuclear energy in the 1960s was projected to provide electricity too cheap to meter; in 1985 one of the world's leading business magazines, *Forbes*, reported, "The failure of the United States nuclear power program ranks as the largest managerial disaster in business history, a disaster on a monumental scale." During those same years, the dumping of hazardous wastes has permitted the production of better things for better living at low cost, but now the Office of Technology Assessment of the U.S. Congress reports that it will take fifty years and hundreds of billions of dollars to clean up the inherited mess. The accompanying damage to human health and the environment goes unmeasured. It is hard to believe that these debacles would have been allowed to happen if enough professional generalists had been involved in government, industry, and finance.

While we in the affluent nations celebrate our success in providing an ever higher material standard of living for our people, the number of our species living in extreme poverty continues to grow. The Population Crisis Committee's 1987 Human Suffering Index, based on ten quality-of-life parameters, rates seventy-four countries with two-thirds of all people on earth as experiencing high to extreme human suffering. Dr. M. Swaminathan, whom I mentioned earlier, wrote in a 1987 paper on nutrition for Africa, "Hunger is a multidimensional problem. Unfortunately our planning and implementation procedures are predominately unidimensional." Our local successes can hardly justify our inattention to our spe-

cies' failure to provide for its own kind. What is required to correct this tragedy is a massive sustained interdisciplinary approach.

What Can A University Do?

People in a number of educational institutions are becoming concerned about the inadequacy of the training they provide. For example, a recent article in *The New York Times* (July 19, 1987) reported that the faculty of the Massachusetts Institute of Technology voted in May 1987 to create a minor in the humanities, arts, and social sciences. Samual Jay Keyser, Associate Provost for Education Policy and Programs at MIT was quoted as saying, "Among the engineers, there is a realization that the social and political implications of the technology are as important as the technology itself." The article also reports "Many educators say that corporations are becoming interested in broadly educated employees rather than those who are well versed in a technology that may soon be obsolete."

To provide more of these broadly educated individuals, we need to create discrete Colleges of Integrated Studies, which would award Bachelor's, Master's, and Ph.D. degrees in integrated studies. The time will come, I believe, when such training will rank among the highest that universities provide, and when leadership positions in society will be dominated by Ph.D.s in integrated studies.

A proposal such as this will, of course, raise questions, and objections. Some will ask about administrative structures or scurry to protect long-standing intellectual territories. Others will ask about funding or power. (If we gain this, what will we lose?) Others will resist because of inertia, because change always means hard work and new ways of thinking. Let me expand my proposal to touch on these.

Such a college could have its own dean and tenured faculty selected from among the world's most renowned generalists with a track record of commitment and involvement in rigorous interdisciplinary teaching and research. This structure would assure full attention to interdisciplinary teaching and research by educators for whom this effort would be their central activity. If such a separate administrative entity existed at the University of Wisconsin–Madison, for instance, it could absorb the present Institute for Environmental Studies and the Integrated Liberal Studies Program (ILS) and serve the goals and needs of other UW–Madison interdisciplinary programs. ILS could be expanded to a rigorous four-year major. Most of the courses in such a college would be interdisciplinary, covering material normally taught in several departments, although a few solid, disciplinary building-block courses would be required. The teaching of math, writing, and speaking skills could be incorporated in the interdisciplinary courses. The four-year undergraduate program would be planned as a whole, each course tailored to fill a portion of the overall curriculum.

An extensive graduate school curriculum could build on the undergraduate program. Each student would be required to become proficient in one foreign language and to study for six months in one foreign country. The research theses would also involve interdisciplinary studies.

Four years of undergraduate education, or a total of eight years for the graduate student, is unlikely to produce the ultimate among generalists. It should, however, provide a solid foundation for a lifetime of learning and a more rapid rise to superior leadership positions.

After several years of discussing the possibility of such a venture with potential funders, I have concluded that the prospects for gaining a substantial endowment for it are excellent, especially if a prestigious university such as the UW were to lead the way. Certainly it would be in the spirit of progressiveness that has characterized our university over its long history.

An alternate scheme would be to create a new institution, a University of Integrated Studies. Its charter might facilitate augmenting its full-time faculty with the part-time appointment of qualified interdisciplinary professors from, for example, the many campuses of the University of Wisconsin System.

Some educators ask who will hire graduates trained as generalists? My conviction is that once they are available, the market will grab them. The world of work calls for frequent career changes. Within a few years, most graduates are working in fields other than the area of their major. A graduate from the rigorous program of integrated studies that I envision would have the flexibility and breadth of understanding, mental skills, and values to stand out in the competitive world of work.

Cynthia Pollock (B.A. Economics and International Relations, 1982) and Jodi Jacobson (B.A. Economics and Political Science, 1983), both of whom obtained certificates in environmental studies at UW–Madison, now do research and write for Worldwatch Institute. Pollock recently wrote, "We joke here that the perfect Worldwatch researcher would be about 1,000 years old, would have travelled the world a dozen times, speak fifteen languages and have studied every discipline. In school, it's hard to believe that a generalist can find a good job. But you can."

In a lecture in 1959, C. P. Snow described "two cultures"—that of scientists and that of humanists—and he discussed the gap in understanding between the two. If he were writing today, I believe he would define the two conflicting cultures of greatest significance to future generations as generalists and specialists.

A great institution like the UW–Madison, which has been so successful in producing outstanding specialists, should now show the way to produce outstanding generalists. In so doing it would be true to the charge given by the Board of Regents in 1894:

> Whatever may be the limitations which trammel inquiry elsewhere, we believe that the great State University of Wisconsin should ever encourage that continual and fearless sifting and winnowing by which alone the truth can be found.

Russell W. Peterson (Ph.D. Chemistry, 1942) is, among other things, president emeritus of the National Audubon Society and vice president and regional councillor of the International Union for the Conservation of Nature and Natural Resources. His training for becoming a professional generalist has included serving as Governor of the State of Delaware (1969–1973), chairman of the President's Council on Environmental Quality (1973–1976), and a member of the commission appointed by President Carter to investigate the nuclear accident at Three-Mile Island. He is a former director of the World Wildlife Fund, the American Association for the Advancement of Science, and the U.S. Association for the Club of Rome. In 1983, he was one of the initiators of a Conference on the Long-Term Worldwide Biological Consequences of Nuclear War, which announced the nuclear winter findings to the world.